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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/824,968	04/15/2004	Alexander T. Garthwaite	SMY-101.01	7446

45774 7590 12/07/2006

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EXAMINER

HOFFLER, RAHEEM

ART UNIT PAPER NUMBER

2169

DATE MAILED: 12/07/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/824,968

Applicant(s)

GARTHWAITE, ALEXANDER T.

Examiner

Raheem Hoffler

Art Unit

2169

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 15 April 2004.
- 2a) ☐ This action is **FINAL**.
- 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-40 is/are pending in the application.
  - 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-40 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 4/15/2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
  - Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
  - Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
  - a) ☐ All b) ☐ Some \* c) ☐ None of:
    - 1. ☐ Certified copies of the priority documents have been received.
    - 2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
    - 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
  - Paper No(s)/Mail Date 3/14/2006.
- 4) ☐ Interview Summary (PTO-413)
  - Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_.

## **Detailed Action**

### **Claim Rejections – 35 USC 112**

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 1-2, 5-6, 8-9, 11-12, 15-16, 18-19, 21-22, 25-16, 28-29, 31-32, 35-36, and 38-39 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The claimed subject matter refers to a “popular-object-evacuation manner”, but failed to clearly define what that manner or process may be. Clarity is needed for differentiating normal and popular criteria when evacuating an object.

### **Claim Rejection – 35 USC 103**

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1-40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Steensgaard et al (US PG Pub No. 20020095453A1) in view of Lewis et al (US PG Pub No. 20050015417A1)

As for Claim 1, Steensgaard et al teaches a garbage collector that collects in increments (see paragraph [0029], [0034]), in each of which the garbage collector collects a respective collection set associated with that increment and consisting of a set of at least one collection-set section (e.g., whereas references teachings of a heap are equivalent to applicant's teachings of a collection-set section; see paragraph [0011]) for which the garbage collector has maintained a respective remembered set associated with that collection-set section, that lists locations where references to objects in the respective collection-set section have been found (see paragraph [0072], [0073], and [0074]), the garbage collector collecting the collection set by employing the threads to search the locations listed by each such remembered set for references outside the collection set to objects in the collection set and evacuating from the collection set objects thereby referred to (see paragraph [0027], [0028]); at least some such objects being thereby evacuated in a first, normal-object-evacuation manner (see paragraph [0069], [0075], [0076], and [0077]). Steensgaard et al fails to explicitly recite a method incorporating a count-map entry associated with that section segment that contains a count value of how many references to an object in the section segment associated with that count-map entry that thread has found, and evacuating "...each object located in a section segment whose count value meets a popular-object criterion". Lewis et al teaches of incorporating a count-map entry associated with that section segment that contains a count value of how many references to an object in the section segment associated with that count-map entry that thread has found (e.g., refcount; Fig. 1A/B;

see paragraph [0005], [0008] and [0031]), and evacuating..."each object located in a section segment whose count value meets a popular-object criterion" (see paragraph [0063], [0068]).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have combined the teachings of object-reference counting within garbage collection as taught by Lewis et al with the garbage collection incorporating remembered sets taught by Steensgaard et al in order to reduce the number of objects sent to a garbage collector, while identifying the difference between garbage and non-garbage items depending upon a multitude of references to other objects.

As for Claim 2, Steensgaard et al teaches each evacuation performed in a popular object-evacuation manner includes placing the object thereby evacuated in a section exclusively occupied by that object (see paragraph [0066], [0069]).

As for Claim 3, Steensgaard et al teaches the garbage collector imposes a minimum object size and no section segment's size is greater than the minimum object size (see paragraph [0011], [0027]). The teachings of Steensgaard et al suggest that the memory manager embodies an allocation module and a heap memory that would be responsible for imposing a minimum object size, as illustrated in applicant's claim language.

As for Claim 4, Steensgaard et al teaches "A) the garbage collector in some increments employs more than one of the threads to search for references to objects in the same collection set section" (see paragraph [0027], [0028], [0029], and [0030]). Steensgaard et al fails to explicitly recite the teaching of "B) the count map that each such thread maintains for that collection-set section is separate from the count map maintained by each other such thread for that collection-set section." Lewis et al teaches of "B) the count map that each such thread maintains for that collection-set section is separate from the count map maintained by each other such thread for that collection-set section" (see paragraph [0005], [0008] and [0031]).

As for Claim 5, Lewis et al teaches "A) increments the value contained in the count-map entry associated with the section segment where the object thereby referred to is located; B) makes a determination of whether that value has reached an individual-map popular-object threshold; and C) if the determination is affirmative, evacuates that object in the popular object-evacuation manner" (see paragraph [0005], [0031], [0063] and [0068]).

As for Claim 6, Lewis et al teaches the collector additionally "A) computes the sum of the values contained in the count-map entries that different threads maintain for the same section segment; B) makes a determination of whether that value has reached a multiple-map popular-object threshold; and C) if the determination is

affirmative, evacuates that object in a popular-object-evacuation manner" (see paragraph [0005], [0008] and [0031]).

As for Claim 7, Lewis et al teaches the individual map popular-object threshold equals the multiple-map popular-object threshold (see paragraph [0005], [0008] and [0031]).

As for Claim 8, Lewis et al teaches the collector additionally "A) computes the sum of the values contained in the count-map entries that different threads maintain for the same section segment; B) makes a determination of whether that value has reached a multiple-map popular-object threshold; and C) if the determination is affirmative, evacuates that object in a popular-object-evacuation manner" (see paragraph [0005], [0031], [0063] and [0068]).

As per Claims 9-10, these claims are rejected on grounds corresponding to the arguments given above for rejected claims 2-3 and are similarly rejected.

Claims 11-20, 21-30, and 31-40 differ from Claims 1-10 in that claims 11-20 are system, 21-30 are storage medium, and 31-40 are signal, whereas 1-10 are method claims. Thus, claims 11-20, 21-30, and 31-40 are analyzed as previously discussed with respect to claims 1-10 above.

### **Conclusion**

5. The prior art made of reference and not relied upon is considered pertinent to the applicant's disclosure.

Yasuda et al (US PG-Pub No. 20030212719A1) teaches a method for heap memory management and computer system using the same method.

Garthwaite et al (US Patent No. 7058670B2) teaches scalable, space efficient, parallel remembered-sets.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Raheem Hoffler whose telephone number is (571) 270-1036. The examiner can normally be reached on 7:30 a.m. - 5:00 p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Christian Chace can be reached on (571) 272-4190. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.




Art Unit: 2169

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

RH



Raheem Hoffler



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PRIMARY EXAMINER